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AUTHOR Haigh, Neil
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ABSTRACT

An increasing number of researchers have contended that the process of teaching is composed of thoughts as well as actions and that a complete understanding of teaching cannot be achieved if research is limited to observable teacher performance alone. A study was designed to examine: (1) the nature of teacher thoughts before and during lessons; (2) the relationship between teacher thoughts and actions; (3) the reasons teachers offer for their thoughts; and (4) the circumstances they believed accounted for teaching success. Data was gathered from three experienced teachers and three student teachers. They were asked to capture their pre-lesson planning thoughts by writing their thoughts as they occurred during the planning process. A stimulated-recall procedure was used to help them identify incidents in the course of the lessons where their thoughts and feelings had been clearly and consciously registered. They answered a questionnaire immediately after they completed their pre-lesson planning and participated in a structured interview. Common to all of the teachers was the view that lesson plans were necessary for their "security." This sense of security rested on the knowledge that at any point in the lesson they knew what they might or should do next. They also felt that when they planned in advance, they were likely to find more opportunities to consciously and calmly contemplate a lesson, its problems, and possible solutions to those problems. Often, however, circumstances made it necessary for the teachers to change or modify their plans. As a result of the teachers' responses, a conclusion is that teacher education programs should emphasize diversity rather than uniformity in lesson plan instruction. Samples of the teachers' planning sheets and responses to interview questions are appended as well as a bibliography of 37 studies on teacher thought processes. (JD)

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RESEARCH ON TEACHER THINKING

NEIL HAIGH

UNIVERSITY OF WAIKATO

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Though it is possible, and even popular, to talk about teacher behaviour, it is obvious that what teachers do is directed in no small measure by what they think. Moreover, it will be necessary for any innovations in the context, practices, and technology of teaching to be mediated through the minds and motives of teachers. To the extent that observed or intended teacher behaviour is "thoughtless", makes no use of the human teacher's most unique attributes. In so doing, it becomes mechanical and might well be done by a machine. If, however, teaching is done, and in all likelihood will continue to be done by human teachers, the question of the relationships between thought and action becomes crucial (Report of the NIE Conference on Studies in Teaching: Panel 6, 1975, p.1).

INTRODUCTION

Most research on teaching has been concerned with what might be termed the surface features of teacher behaviour - that is, behaviour that is amenable to observation and measurement by an outside observer. Such research generally appears to have been based on the assumption that the meanings attached by an observer to aspects of a teaching performance will be almost invariably the same as those that the teacher and pupils have 'in mind', and that descriptions of teacher and learner thoughts are therefore not required in accounting for the activity of teaching and its relationship with learning. Over the past decade, however, an increasing, albeit still relatively limited, number of 'teaching' researchers have challenged this assumption: they have contended that teaching necessarily represents a set of attributes of thought as well as overt actions and that a complete understanding of the phenomenon of teaching and its outcomes can not be achieved, therefore, if researchers limit their attention to observable teacher acts alone.

There are two broad reasons for the shift in stance taken by these researchers. First, there has been recognition that certain conceptual premises and modes of inquiry, largely 'borrowed' from the natural sciences and traditionally associated with research on teaching, may not be appropriate when we attempt to understand the actions of people in social contexts such as classrooms. Alternative premises and forms of inquiry have been proposed that, if accepted, require researchers to view the thoughts of teachers as a necessary aspect of the subject matter of their research and legitimize the use of research procedures that allow data on teaching behaviours to be interpreted from the point of view of the teacher. Second, there has been acknowledgement that many of the questions and

'practical' concerns people have concerning the effectiveness of teachers and the means by which they might be helped to become more effective simply cannot be answered satisfactorily without information about the 'mental life' of teachers. These two reasons are now discussed more fully and with particular reference to my own recently completed study of teacher thinking.

MAINSTREAM RESEARCH ON TEACHING: ASSUMPTIONS, CHALLENGES, SHIFTS

In order to highlight the conceptual and methodological shifts that have recently prompted some researchers to turn their attention to teacher thinking, a brief account of the assumptions and methods that were associated with the mainstream of research on teaching through the 1960's and early 1970's is first presented and then the challenges offered to them are detailed. In presenting the former, I acknowledge that a caricature of the predominant forms of research may be the result of such a brief summation. It is clear, however, that there were concepts and methodologies that tended to characterise a greater proportion of the research during this period.

The dominant research objective in those years was the identification of teacher attributes that could be demonstrated to have a significant and consistent relationship with learners' achievements. Explanation, prediction, and ultimately control of such relationships were assumed to be tenable objectives for research on teaching, and they rested on an assumption that the nature of the teaching-learning relationship allowed for the existence of 'lawful' cause - effect relationship between particular teacher behaviours and those of learners. These objectives were associated with the 'positivist' philosophical movement "the distinguishing feature of which is the attempt to apply to the affairs of man the methods and principles of the natural sciences" (Heather, 1976, p.3). The scientific method that was associated with the natural sciences, and deemed appropriate to the study of human action, was based on assumptions that

- (a) people live in a knowable, real world that has an objective reality which is not the creation of individual minds;
- (b) causal links can be established between events, and there is constancy in particular phenomena and regularity about the way events are determined by other circumstances (i.e. determinism); and
- (c) the only kind of reliable knowledge is that which depends on evidence which is verifiable by direct observation (i.e. empiricism).

From the positivist stance, people could not be credited with the ability to be causes of their own behaviour. Behaviour occurred when something happened to the person, and thoughts the person might have about future circumstances were held to constitute behaviour that followed from particular events rather than represent a category of event that might 'call forth' particular behaviours. Consequently, thoughts about future events were not deemed necessary explanatory concepts for behaviour. In addition, as thoughts did not represent phenomena that could be directly sensed and classified, they were unlikely to be accepted as legitimate data. For researchers on teaching who undertook research within the constraints of these assumptions, the proposition that elements of teachers' mental lives might represent explanatory antecedents for their actions was not likely to be contemplated.

In attempting to explain, predict and control causal links between events (including teaching-learning), researchers operating within this framework were required to fulfil certain criteria for their research to be 'good'. For example, if they claimed that causal relationships did exist between the behaviours of teachers and learners, they were expected to demonstrate that change in dependent variables (learning behaviours) occurred as a consequence of the independent variables they nominated, and were not due to other variables. Thus, control of variables was an over-riding concern for researchers, and as an ideal they were required to provide evidence that they had tried to identify, take into account and, where possible, directly control all of the variables that might plausibly influence the dependent variable. Various techniques (e.g. random sampling, control groups, standardization, statistical control) were specified as means of eliminating ever-present threats to the validity of research (e.g. maturation, history, selection, instrumentation).

Educational researchers generally recognized that there were particular problems that might make it more difficult to explain, predict and control social as opposed to natural phenomena (e.g. the more complex nature of social phenomena, the greater difficulty of making direct observations of phenomena, the less repeatable quality of social phenomena, and the "incalculable element" of human free will which constantly changes the nature of social phenomena; Van Dalen, 1973, pp30-34). Few, however, queried whether the objectives of prediction and control were tenable in the context of all human behaviour.

Assumptions Reappraised: Researchers in education could not, however, remain immune from forces for change in social science research that were evident during the late 1960's and the 1970's. In particular, an increasing number of philosophers and social scientists began to argue that 'positive' assumptions about human nature and scientific method were unsound. The challenges offered to the assumptions previously noted included the following.

First, the general premise was queried that it was possible to identify cause-effect relationships between the behaviours of people that would consistently hold up across differing contexts of situation and time (Harre and Secord, 1972; Thomas, 1972; Shotter, 1975; Heather, 1976; Magoon, 1977). As an alternative to the associated assumption that people could be viewed as 'objects' or 'reactors' whose actions were essentially determined by conditions and events that they could not in principle control, it was proposed (a) that people were in many contexts the agents of their own actions, and (b) that their thoughts about circumstances that they would wish to bring about in the future could be viewed as explanatory antecedents for their subsequent actions.

Thus people's actions are not to be explained causally, as sequences of objective events linked by causal principles, but intentionally. That is, in general, people's actions are to be explained as attempts to help in the realization of projects, goals, enterprises or ideals which they have invented amongst themselves. And it is in this respect, its direction towards the realization of ends that do not as yet exist, the way that it brings into existence things entirely new, that human action must be considered as essentially constructive (Shotter, 1975, p.91)

Thus, such constructs as intention, purpose and plans were claimed to be necessary ingredients of explanations offered for at least some domains of human behaviour.

Second, associated with this view was the proposition that human behaviour could be described as rule-governed as well as law-governed. In circumstances where behaviour was described as rule-governed, regularities in behaviour followed from conventions (rules) which had been constructed, negotiated, or accepted by the person and which specified goals and actions that would be appropriate when particular situations were encountered. Such rules might be broken or amended at any time and the relationships they described were, therefore,

probabilistic. In ~~contrast~~, law-governed behaviour defined instances of behaviour in which a person could not voluntarily choose to engage. The occurrence of particular circumstances would consistently and invariably evoke certain behaviour. It was contended that:

... the psychologist must concern himself with rule following because an individual person is by definition, responsible for his actions; in other words, he forms plans and executes them according to rules (Heather, 1976, p.23).

Third, the proposition that there is an objective, external reality which will be experienced and interpreted identically by all observers was challenged by the proposition that people actively construct a personal, subjective view of reality. This meant that people might have similar or dissimilar constructions (meanings) for phenomena they experienced, and it was proposed (e.g. Harré and Secord, 1971; Magoon, 1977) that study of these shared and dissimilar meanings be a central task in a science of human behaviour. Thus Harré and Secord contended that since the "giving and grasping of meanings" are the basic activities that underlie such social interaction, "greater precision of the delineation of meanings is what corresponds in the social sciences to the development of greater accuracy of measurement of parameters in the physical sciences" (p.132). Indicating the significance of this proposition for the research process, Magoon noted that "the constructed worlds of both the researcher and the observed human subjects need to be accounted for in any scientific explanation" (p.686).

This concern that subjects' constructions of reality be taken into account necessitated a reappraisal of prevailing views regarding the likely reliability of objective and subjective data. Researchers operating within the positivistic stance were unlikely to accept subjects' reports of their behaviours, particularly their covert thoughts and feelings, as a reliable or trustworthy source of data. The opposing view claimed that if certain procedures and precautions were used, subjects' self reports could or should be accepted as an accurate, as well as a necessary, source of data. Scriven (1972), for example, argued:

If we can test someone's claim on a very large number of occasions and find him extremely reliable, we have good reason to believe him on other occasions when he testifies about events of a kind that we know to exist

even though we cannot check them directly ourselves, that is, unless we know of some pervasive source of error about such testimony by him that over-rides the prima facie case we can build up from his usual reliability. (p.96)

In addition, it was suggested by some (e.g. Heather, 1976, p.27) that if the requirement that observations be truly objective was taken to its logical conclusion, the observer could only report physical characteristics of behaviours. To provide 'intelligible' accounts of the behaviours of people was likely to require the observer to take into account their inferred or reported thoughts and feelings. Shotter (1975) observed also that if behaviour were studied solely from the perspective of an external observer, no distinction was possible between behaviour for which people are responsible and behaviour,

which merely happens irrespective of our agency. In other words, we ourselves do not do all that we may be observed to do, and although this may be apparent to us it is not apparent to merely external observers (although it can be apparent as we shall see to those who more than merely observing involve themselves in exchanges with us). (p.85)

Implications for One Study of Teacher Thinking: In the context of my own study of teacher behaviour, consideration of these arguments lead me to adopt the following views concerning (a) the concept of teaching, (b) the subject matter for research on teaching, and (c) the validity of teacher self-reports about their teaching thoughts.

First, I defined teaching as an intentional behaviour: that is, behaviour which is associated with thoughts about (a) particular end-states (new learnings) that it is hoped to facilitate in someone, and (b) a particular course of action that might allow these ends to be achieved. I assumed that unless teachers had such intentions in mind (or at least implicitly so) then they could not be said to be teaching but to be engaged in some other kind of activity (e.g. administration or custodial). The teachers' thoughts, then, were considered to delineate the meaning of their overt actions and therefore demanded the attention of the researcher.

Second, I concluded that teaching involved five major kinds of activities (covert as well as overt) and that all of these activities, as well as their products and the factors that might shape them, required my attention if I was to 'do justice' to a study of the teaching behaviours of a sample of teachers. The five activities identified were:

- (i) Taking account of the conditions that it is believed might influence one's ability to facilitate particular pupil learnings.
- (ii) Deciding on the learnings that would be appropriate pupil goals, given these conditions above.
- (iii) Formulating a plan of action specifying how conditions might be arranged in order to facilitate the desired pupil learnings.
- (iv) Implementing teaching plans, sometimes with modifications to original intentions.
- (v) Monitoring and evaluating the extent to which intentions that are reflected in teaching plans are implemented and realised.

Third, I considered that teachers' self-reports of their thoughts could be treated as valid data as long as procedures were used that (a) would ensure that teachers reported fully and honestly on their thoughts, and (b) would enable the researcher to confirm that the meaning he ascribed to teacher accounts of their thoughts did accord with the meaning that the teachers had in mind. Procedures that I subsequently developed for my own study are outlined later in this paper.

LOOKING FOR SOLUTIONS TO 'PRACTICAL' PROBLEMS

The view that 'doing justice' to research on teaching demands attention to covert as well as overt aspects of teacher behaviour is not the only reason why researchers have taken an interest in teacher thinking. They have also anticipated certain practical pay-offs from research findings concerning teacher thinking. Thus, for example, I hoped that insights that I gained from my own research into this aspect of teaching would help me answer certain questions concerning the effectiveness of teacher education courses that I was involved in.

Most of these questions arose from my observation that specific teaching behaviours introduced to students during coursework were often not 'demonstrated' by the students in subsequent teaching practice situations. Pre-lesson planning was one teaching activity where this often seemed to occur. Typically using a checklist approach, courses presented students with recommendations about the elements of teaching-learning situations that they should ideally think about when planning for lessons (e.g. "You should think about the following learner conditions whenever you formulate lesson plans"). Students were generally expected to fill-in

prescribed planning records to provide evidence that they had thought about these elements and that they had been considered in an appropriate sequence (e.g. learning objectives had been specified in performance terms as a first step in the planning process). The evidence that I gained from observation of students in teaching practice situations, from students 'honest' self-reports of their approach to planning and reflections on my own planning highlighted the fact, however, that these recommended practices were often not adopted. Idiosyncrasy as much as similarity seemed to characterize individual students' planning practices.

There were clearly several possible explanations for this situation and each of these, if it proved to be valid, had quite different implications for the design of future coursework on planning. The explanations included the following:

- (i) Teaching within courses may have been ineffective so that some students may not have understood the rationale advanced for a particular planning strategy, or what the strategy entailed;
- (ii) some students may have consciously rejected recommended approaches in favour of their own intuitive practices;
- (iii) some students may not have realized that there was a discrepancy between their actual planning practices and their intention to employ a recommended approach; and
- (iv) some of the assumptions that course teachers had about what, how and when teachers can best think about aspects of teaching situations may have been unreasonable or untenable.

It was also apparent, however, that the validity of these explanations could not be readily established without having information on hand about the actual thoughts of student teachers and experienced teachers during the planning process. In addition, information was required concerning their perceptions of and beliefs about their own planning practices.

Practical concerns such as the one described here and my inability to resolve them without information about teacher thinking provided a further rationale, then, for undertaking research on this topic.

ONE STUDY OF TEACHER THINKING AND ITS EDUCATIONAL IMPLICATIONS

As suggested earlier, research on teacher thinking is of relatively recent origins and the number of studies undertaken world-wide is still rather limited. Over the last five years, however, a burgeoning interest in this area has resulted in

studies being undertaken on one or more of the following four themes:

THEME	REPRESENTATIVE STUDIES
Teacher Pre-Lesson Planning	Zahorik, 1975; Morine-Dersheimer, 1977; Toomey, 1977; Yinger, 1977; Peterson, Marx and Clark, 1978; Clark and Yinger, 1979; McCutcheon and Kyle, 1979; Smith and Sendelbach, 1979.
Teacher Interactive Thoughts	Morine-Dersheimer and Vallance, 1976; Peterson and Clark, 1978; McKay and Marland, 1978; McNair and Joyce, 1979; Morine-Dersheimer, 1979; Joyce, 1979.
Teacher Judgement	Morine-Dersheimer, 1976; Shavelson, Cadwell and Izu, 1977; Joyce, Morine-Dersheimer and McNair, 1977; Clark and Yinger, 1979.
Teacher Theories	Beck, 1976; Bussis, Chittenden and Amarel, 1976; Barr and Duffy, 1978; McKay and Marland, 1978; Joyce, 1979; Ross, 1979.

The study that I have recently completed is one of the first in which all of these aspects of teacher thinking have been explored in the same study. Therefore, it may serve to illustrate some of the research methods and findings that have been associated with studies of these aspects of the mental life of teachers. A brief description of the objectives, design and procedures of the study is now presented and then some of the findings and their educational implications are reviewed.

Objectives of the Study: At the outset of the study, my assumptions about the phenomenon of teaching, together with my wish to resolve several practical problems, prompted a number of general research questions. These concerned the nature of teacher thoughts before and during lessons; the relationship between teacher thoughts and actual teacher actions; the 'reasons' teachers might offer for their thoughts; and the circumstances that they believed accounted for the relative success of their attempts to put thoughts about particular teaching situations into effect. As I began to further explore conceptual issues and trial data collection and analysis procedures, it became apparent that additional research questions would need to be followed up if my objective of providing a holistic account of the activity of teaching was to be realized and the educational implications of the data clearly established. Thus, answers were also sought to questions that concerned the cognitive activities involved in teacher thinking, the extent to which teachers

thought about elements of lessons in a 'systematic' manner, and the factors internal and external to teachers that might account for similar and contrastive features of their thinking and thoughts.

Design and Procedures: Data relevant to these research questions were gathered from three experienced teachers and three student teachers who were each asked to teach three small group discussion lessons. Several data collection procedures were developed to help the teachers report fully on the focus of their attention and thoughts prior to and during their lessons.

- (a) Pre-lesson planning thoughts were captured by having teachers make a 'stream of consciousness' record of emerging thoughts. The procedure required the teachers to make a written record (abbreviated, annotated) of their thoughts preferably at the time they actually entered consciousness (See Figure 1, p.21 for a sample planning record sheet). It was recognized that planning thoughts might be experienced at times when the recording sheet was not at hand (e.g. driving to work, under the shower) and in those circumstances the teachers were asked to record such thoughts at the most immediate, convenient time. To provide additional detail on the time and the duration of instances of planning, teachers were also asked to note the place and time of day at which planning occurred.

No teachers reported finding this a difficult or unnatural procedure to follow. A number observed that they often made similar abbreviated notes of their planning thoughts.

- (b) A 'stimulated-recall' procedure was used to help the teacher identify incidents in the course of the lessons where their thoughts and feelings had been clearly registered in consciousness. This procedure simply required the teachers to listen to an audio-tape of the lesson immediately after it had been completed and, prompted by this tape-record, to indicate and report on the points during the lesson where they could recall having consciously registered and responded to the course of events (See Figure 2 , p.22 for a sample record of teacher and researcher dialogue associated with such an incident).
- (c) In order to gather information about the planning experience that would not necessarily be revealed in the 'stream-of-consciousness record', the

teachers answered a brief written questionnaire immediately after they felt they had completed their pre-lesson planning. The questions asked focussed on the relative ease of planning for aspects of the lesson the teacher's predictions concerning the likelihood of the lesson going as planned and the ease of implementing planned actions.

- (d) A structured interview was used to uncover the teachers' perceptions of and beliefs about their own day-to-day conscious experience of teaching. Topics touched on included current attitude towards teaching, pre-lesson planning practices, modification of plans, cues for monitoring lesson outcomes and learner behaviours that 'satisfy' and 'annoy'.

The validity of the information gathered through use of these procedures rested on the adequacy of the steps that I took to ensure that (a) the information was relevant to the purpose of the study (e.g. the teachers reported on conscious thoughts), and (b) my interpretation of teacher self-reports was accurate. Three broad approaches were adopted to maximize the likelihood of valid information:

- I endeavoured to confirm the accuracy of my interpretations of teacher self-reports;
- I attempted to rule out potential sources of invalidity;
- I endeavoured to establish conditions under which it was most likely that valid information would be generated.

The specific methods associated with these approaches included the following:

1. As a means of ensuring that teacher self-reports of the focus of their thoughts were accurately categorized¹ I systematically discussed their meanings with the teachers who were asked to clarify, confirm/disconfirm and where necessary correct my interpretations (See Figure 3, p.23 for an example of this Meaning Review-Clarification-Confirmation procedure). This procedure was used when planning record, plan questionnaire and stimulated recall data were categorized.

¹ A comprehensive system for categorizing the focus of the teachers' pre- and within-lesson attention and thoughts was developed (See Figures 4 and 5, p. 24 - 25 for a summary of categories).

2. 'Investigator' and 'methodological' triangulation was employed so that a number of perspectives were obtained on a common set of data (i.e. teacher perceptions of thoughts and actions, researcher observation of teacher actions; teacher 'stream of consciousness' self-reports, teacher questionnaire self-reports, teacher 'stimulated recall' self-reports, teacher structured interview self-reports, observed (audio-taped) teacher actions.
3. Data collection procedures were designed to ensure that there was minimal delay between the time thoughts were registered in consciousness and the time they were recorded or recalled. Where recall was of necessity delayed, a memory 'prompt' was used to facilitate more accurate recall.
4. Teachers were asked to refrain from putting more than usual time and effort into their teaching. To encourage this I indicated that I was interested in the 'normal', everyday realities of teaching and was also familiar with the conditions in school settings that could limit their opportunity to undertake teaching activities as they might ideally wish.
5. Teachers were told that no item of information that they might be able to offer about aspects of their teaching was likely to be irrelevant or insignificant. Thus, I had no preconceptions about the value of particular types of information.
6. Teachers were assured that information was not being gathered in order to make judgements about the relative effectiveness of their teaching. I attempted to avoid making statements that suggested such a judgement and the reasons why a non-judgemental stance was adopted were briefly discussed with teachers.
7. Finally, I endeavoured to ensure that an open, cooperative and relaxed relationship was established and maintained with teachers. Steps taken to facilitate this included: careful selection of participating teachers briefing teachers fully on all aspects of the study; and adopting an informal but hopefully not a casual, approach to all interview situations.

Each of the respective approaches, and the specific methods associated with them, inevitably has limitations. For example, (a) teachers may unwittingly or

wittingly provide inaccurate confirmation/disconfirmation of the researcher's interpretation of data; (b) where data gathered from multiple perspectives and methods is conflicting, it may be difficult to establish which parts of the data are valid and which are not; (c) where an attempt is made to rule out possible threats to validity (e.g. 'unnatural' teaching action, selective reporting of information), there can be no absolute certainty that this objective is achieved; and (d) the conditions seen as favourable to the research may not be successfully established.

While I can not claim to have ruled out all of these potential limitations in this study, I deliberately developed a range of methods that were intended to maximize the likelihood of valid data and in a more detailed report of the study (Haigh, 1981) I have acknowledged and discussed particular limitations that were evident to me.

SELECTED FINDINGS AND THEIR EDUCATIONAL IMPLICATIONS

A complete set of data was initially gathered from 18 teachers. From this pool, case studies were prepared in turn for six teachers (three experienced teachers, three student teachers).¹ The first case was selected on the basis of impressions formed during data collection that some features of the teachers' thoughts and consequent actions seemed to provide a contrast to those reported for teachers in other studies. Subsequent cases were chosen on the basis of their apparent dissimilarity with those already considered. Thus, after each case had been exhaustively analysed and interpretations and conclusions made, a case that appeared to incorporate additional or different features was selected. In effect, I set out to 'test' tentative conclusions from cases already reviewed by selecting further cases that seemed likely to disconfirm or reveal limitations in those conclusions.

Having noted earlier that one of the practical concerns that prompted any initial interest in this area of research was teacher planning, I will now discuss some of the findings from the study that have relevance to that issue.

¹ Initial estimates of the time required for data collection, data analysis and interpretation proved very inaccurate. This 'finding' should be taken into account by researchers embarking on similar studies.

Why Plan Before Lessons? Exhortations on the need to plan are an almost inevitable feature of teacher education programmes and the data of this study, as with others (Clark and Yinger, 1979; McCutcheon and Kyle, 1979), certainly indicated that planning was likely to occupy a significant amount of a teacher's time, both within and outside of the confines of the classroom and school. It was also apparent that while planning generally occurred as a deliberately initiated activity, planning thoughts might also emerge into consciousness without a deliberate effort to plan on the teacher's part and in almost any context of time and location. These findings suggested that teacher educators and classroom teachers were likely to share a common viewpoint on the need for this activity. The data which emerged, however, also indicated that teachers' beliefs concerning the ends served by planning and the actual ingredients of their plans could show marked differences as well as similarities.

Common to all teachers was the view that plans were necessary for their 'security' in lessons - security that in its most simple terms rested on their knowledge that at any point in the actual lesson they would know what they might or should set out to do next. Both Jackson (1968) and Smith and Geoffrey (1968) pointed up clearly in their pioneering 'holistic' studies of teacher behaviour that teachers can never take into account and directly control all of the conditions that will contribute to the children's learning achievements. They therefore have to: (a) accept that lesson conditions and events will be characterized by complexity, spontaneity, immediacy and uncertainty; and (b) recognize that their plans can at best have a high probability of proving appropriate. It is understandable that these realities are likely to induce a degree of insecurity or psychological discomfort in teachers and that they would wish to avoid or reduce this state if possible. The commentary of the teachers in this study, both as they set about formulating and implementing their plans and as they commented in general on their teaching theories and practices, indicated that they saw discussion lessons in these terms. Their preparation of plans allowed them to anticipate these realities and to envisage how they might arrange conditions so that some elements of the lesson would become more predictable and their security thereby increased.

The teachers obviously believed that their pre-lesson plans 'paid off' in terms of their teaching effectiveness as well as their own mental health. When they planned in advance of rather than in the course of discussion lessons, they were likely to find more opportunities to consciously and calmly contemplate a lesson, its problems and possible solutions to those problems. As the data

from this study clearly indicated, once such lessons are underway, teachers' information-processing capabilities are likely to be loaded, if not overloaded, by a number of other inescapable and competing demands that limit opportunities for calm, rational planning. The conditions that accompany instances of pre-lesson planning are more likely then to facilitate effective planning and thus effective teaching. They may also increase teachers' confidence in the probable effectiveness of their planning and this state, along with that of security, may further contribute to their teaching effectiveness.

At least three important educational implications follow from these conclusions. First, in the course of making recommendations and offering suggestions about the activity of planning, teacher educators should raise the question, 'Why plan?' Teachers should be given the opportunity to consider how their plans may influence both their effectiveness in facilitating children's learning and their own mental health.

Second, questions need to be pursued regarding the reasonableness of the assumption that teachers should be able to make major modifications to plans in the course of lessons; to readily follow up the emergent interests and ideas of learners; to teach 'off the cuff'. As the findings of this study suggest, there are conditions inherent in teachers and teaching-learning situations that may make such on-going planning difficult, if not impossible. In any case, it may sometimes even be unnecessary. For example, conditions in discussion lessons may allow few opportunities for teachers to divert their attention from immediate events in order to consciously formulate specifications for a future portion of the lesson, and the prospect of deviation from existing plan specifications or the requirement that plans be generated 'on the spot' may create unacceptable pressures and stress for some teachers. Planning prior to lessons may be the only realistic means of meeting the needs of learners and teachers in many contexts.

Third, given the significant instructional and psychological benefits that are associated with the formulation of plans, efforts need to be made to establish whether teachers do, in fact, have the resources of time and materials available that they believe are necessary if they are to at least minimally fulfill the criteria they associate with adequate planning. As was evident in at least two cases in the present study, teachers who have a number of administrative as well as professional responsibilities may find their opportunities for planning unduly curtailed.

Contrastive Features of Teacher Planning: While there may be similarities in teachers' responses to the question 'Why plan?', the findings of this study also indicate that individual teachers may differ significantly in respect to both the 'typical' ingredients of their actual plans and their beliefs about the ingredients of a 'good' plan. In terms of ingredients, for example, there were clear differences evident between teachers in respect to: (a) the number of teacher actions planned; (b) the degree of scripting of planned teacher statements; (c) the number of cognitive and affective learning behaviours, topics, and 'correct' responses specified; and (d) the presence or absence of sequence specifications for particular elements of the lesson.

The data from this study also indicated that the teachers' approach to planning did not generally accord with the rational decision-making and ends-means models of planning that some theorists have considered characterize the planning process (e.g. Smith and Geoffrey, 1968; Shavelson, 1976). Rather, they support the view of Clark and Yinger (1979) that planning is most appropriately viewed as a problem-solving activity that typically moves through a succession of stages in a cyclic rather than linear pattern. The type, pattern and stability of stages showed both similarities and significant differences for individual teachers.

The factors that accounted for such differences could be differentiated into two broad categories. In the first were those internal to the teacher. Examples of these factors included tolerance for uncertainty; commitment to the propositions of an academic or personally-constructed teaching theory; information-processing capabilities; knowledge and assurance that specifications for some elements of the lesson would be automatically selected and implemented once lessons were underway; knowledge of relevant subject-matter; the 'repertoire' of alternative specifications that could be brought to mind; perceptions of the constraints imposed on plan specifications by such factors as learner attributes and lesson objectives; and attitude towards the activity of planning.

A second category encompassed conditions external to the teacher. These included the time available for both planning and the actual lesson and the availability of particular material resources. Similar observations have been recorded in the limited number of previous studies that have taken such personal and contextual factors into account (McCutcheon and Kyle, 1979; Clark and Yinger, 1979).

The factors that accounted for the differences between teachers also accounted for the consistencies that were evident in the planning process and plans of individual teachers from one lesson to the next. For example, where teachers appeared to have more tolerance for uncertainty and where they placed value on following up ideas introduced by the children they were consistently more likely to leave the selection of some topics, acceptable responses and sequence specifications until lessons were actually underway. Where tolerance for unpredictable circumstances appeared to be lower and where teachers were inclined to view their plans as being essentially complete and 'correct', they were more likely to specify a finite set of topics and responses that would be dealt with in a pre-determined and relatively inviolate sequence. These conclusions find some support in the findings of previous studies. Thus, Peterson, Marx and Clark (1977) have pointed to the relationships that may exist between teacher cognitive processing styles and abilities, planning procedures, plans and actual teacher actions as plans are being implemented. Toomey (1977) and Clark and Yinger (1979) have noted that the value placed on spontaneity and the matching of plans to immediate and emergent learner needs, ideas and interests are factors that may account for consistencies in planning practices. Yinger (1977) concluded that 'established thoughts patterns' as well as 'intuitions and dispositions towards teaching' meant that some consistency could be expected when teachers encountered similar planning problems.

Planning procedures and plans are unlikely, however, to be completely consistent from one occasion to another. As the data from the research lessons indicated, and the teachers pointed out in general commentary, there were a number of circumstances that made it necessary or appropriate for them to modify the process of planning and the content of their plans for different lessons. These observations also held for the student teachers despite their more limited teaching experience.

When the significance of this catalogue of factors is assessed, a number of educational implications can be identified. First, given their range and potential impact, diversity rather than uniformity in planning practices and plans would seem to be both inevitable and appropriate. The data therefore raise questions on whether or not it is possible to prescribe a 'best' approach to planning. Rather than be offered such prescriptions, I believe teachers should be given opportunities to analyze their own, existing planning practices and the contribution that the factors outlined above may make to them; to self-evaluate the contribution that their plans may make to the successes,

difficulties and failures they experience in meeting both learner and personal needs during lessons; and to gather information about and experiment with alternatives to their existing planning practices. Procedures used in this study to help teachers recall and record their thoughts and to analyze the focus of those thoughts can be used by teachers undertaking these activities. (This approach has received some field-testing in a teacher education course at Hamilton Teachers College.) In addition, teachers may well benefit simply from having increased opportunities to share the 'wisdom' of fellow teachers as well as researchers concerning this aspect of teaching. For example, teachers may be helped to develop: (a) planning record procedures that will ensure that 'out of the blue' planning thoughts are not lost from memory; (b) procedures that will facilitate the retention and retrieval of plan specifications (e.g. mental rehearsal, prompt notes); and (c) strategies that will allow greater opportunity for planning within as well prior to such lessons (e.g. slowing the 'pace' of discussion, limiting chorus-answering by children).

Second, the advocates of particular curriculum and teaching practices need systematically to assess and to take into account the demands these may make on teacher information-gathering and processing capabilities. For example, implementation of propositions concerning the individualization of instruction may require teachers to attempt to hold in mind much more information than can be actually handled given the limitations of memory. Thus, the fact that plans for this group of teachers were almost invariably formulated for the group as a whole may well reflect the teachers' awareness of their own limitations in memory rather than indicate a lack of sensitivity to the differing attributes and needs of individual children. It is also apparent that teachers may believe that modification of plans to accommodate individual differences will at times most appropriately occur as lessons are actually underway, and the actual rather than anticipated responses of the children can be taken into account.

As a third implication of the findings concerning individual differences in planning practices, it is recommended that the advocates of major changes in curriculum or teaching practices take particular account of teachers' existing teaching theories as well as their intuitions and dispositions towards teaching. Resistance to change that is sometimes ascribed to teachers' inflexibility, close-mindedness etc., may be quite understandable when there are fundamental conflicts between teachers' established beliefs and those associated with the innovations being promoted. These conflicts may not readily be resolved,

particularly where teachers are provided with few opportunities to reflect on the need for change, and to explore their own capacity to make the changes in thought and actions that would be required. As Ross (1979) has observed previously, teachers will vary in their preparedness to compromise their own theories when implementing assigned instructional approaches or programmes, and one of the consequences of continuing conflict between the teachers' own theories and those of other educators may be an inability of both parties to successfully implement their theories.

CONCLUSION

In this paper, a case for continued research on teacher thinking has been argued on two grounds. First, I have contended that teaching is defined by a set of attributes of thought as well as observable performances and that researchers must attend to both aspects if they are to provide a complete and accurate account of teaching and its relationship with learning. Several procedures that may be used by researchers to help ensure the validity of data concerning the thoughts of teachers have been discussed. Second, I have claimed that insights gained into teacher thinking can help educators enhance the inherent thoughtfulness, and thus effectiveness, of teaching.

To date, the number of researchers who have accepted this case and completed studies of teacher thinking is small. The methodological demands of such studies have also generally meant that relatively few teachers and teaching contexts have been studied in each investigation. As a result, researchers have really only just begun to uncover the cognitive activities that may be involved in teacher thinking; the possible content of teachers' thoughts in different teaching situations; the factors that may account for these cognitive activities and thoughts; and the impact that particular patterns of thought may have on teachers' overt actions and learners' learning. There is a need, then, for further studies that continue to examine these same aspects of teacher thinking in different teachers and in different contexts.

In addition, the educational implications that follow from the findings of past studies point up the need for research on several other aspects of this topic. For example:

systematic studies of the demands that particular 'recommended' teaching practices make on teachers' information-processing capabilities should help establish whether these practices are tenable for all, or only some, teachers;

investigation of the 'thoughts experienced by teachers' when they are encouraged or directed to adopt new teaching theories or practices may reveal some of the conditions that help or hinder the introduction of innovations in teaching; and

there should be assessment of the validity of the assumption that teachers will be encouraged to experiment with and modify or extend their own patterns of attention and thought if given opportunities to systematically review and reflect on aspects of their own mental lives.

FIGURE 1: Sample Planning Record Sheet

LESSON NO. THREE		DIRECTIONS: Please record your planning thoughts below. As ideas come to mind, are considered, accepted, rejected, modified etc., note them down in column one in a simple annotated or abbreviated form. At the end of the actual planning, go back and fill out, reword or rewrite notes that you feel may be unclear in meaning or illegible, Use column two for this.
SHERYL		
FIRST NOTES	REVISED NOTES	PLANNING TIME
Is advertising a good thing? Ask question- Is there anything that you have seen advertised that you would like to buy/go to etc. Can you obtain that thing? [If children can't. Why not? And would they want it if you had not seen it advertised?] Could also get chart of ads and ask whether there is anything on chart that children might want? May be best to define advertising again - at beg. of lesson, and then get children to help tell of times when advertising has helped. ie times when it has led to a purchase. Discuss purchase and whether it would have been made if there had not been an advert. Are adverts always helpful, always a good thing? Think of other times when adverts help people (blood donors, tax, out as a deterrent against smoking etc.) Chart could come in handy here.		Mon. 16th Oct. 5:00 - 5:20 pm

FIGURE 2 : Sample Stimulated Recall 'Incident' Recording Sheet

TEACHER	LESSON NO.	INCIDENT NO. 5	REFLECTIONS																																								
R Were you aiming for a higher-order classification?			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>PLN</td> <td>ACT</td> <td>INF</td> <td>CON</td> </tr> <tr> <td></td> <td>✓</td> <td></td> <td></td> </tr> </table>	PLN	ACT	INF	CON		✓																																		
PLN	ACT	INF	CON																																								
	✓																																										
T Yes. Now this was a decision I had not planned on. <u>They seemed..Their groupings seem to split themselves initially into two clear groups.</u>			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="7">PERCEPTIONS</th> <th>CI</th> <th>GP</th> <th>IN</th> </tr> <tr> <td>LSL</td> <td>TRC</td> <td>TAF</td> <td>CPE</td> <td>MAN</td> <td>PCO</td> <td>TIM</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>✓</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td>VS 50</td> <td>OLE</td> <td>AVG</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>5</td> <td></td> <td>✓</td> </tr> </table>	PERCEPTIONS							CI	GP	IN	LSL	TRC	TAF	CPE	MAN	PCO	TIM	✓			✓				✓			VS 50	OLE	AVG								5		✓
PERCEPTIONS							CI	GP	IN																																		
LSL	TRC	TAF	CPE	MAN	PCO	TIM	✓																																				
✓				✓			VS 50	OLE	AVG																																		
							5		✓																																		
R That was your impression of what they'd ended up with?			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="4">ANTICIPATIONS</th> </tr> <tr> <td>TRC</td> <td>ACC</td> <td>EST</td> <td>ENC</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table>	ANTICIPATIONS				TRC	ACC	EST	ENC																																
ANTICIPATIONS																																											
TRC	ACC	EST	ENC																																								
T Yes. I decided..that would be a conscious decision..by golly, let's try this one..I'll try to get them to come up with these two, because it would solve two problems. I made it to solve the problem of a lot of product sub-categories that needn't have been discrete categories at all actually.																																											
R The same sort of problem as Aaron and Harley had?			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="4">JUDGEMENTS</th> </tr> <tr> <td>APP</td> <td>ECF</td> <td>IAS</td> <td>MNG</td> </tr> <tr> <td>✓</td> <td></td> <td></td> <td></td> </tr> </table>	JUDGEMENTS				APP	ECF	IAS	MNG	✓																															
JUDGEMENTS																																											
APP	ECF	IAS	MNG																																								
✓																																											
T Yes. They had fire-places, shower, electric shaver ads and so on. So we initially..I decided, well, we'll put those into a larger group, larger groups, and that would solve that problem..and also the second purpose was that there were some there that were difficult to fit in anywhere. Would they be a separate larger group on their own, or..and in the end, I didn't. One set there about, oh the political broadcast, the political meeting for Mr Muldoon, and the one about the church services, stayed towards the non-productive, entertainment ones. Away from the..sorry..towards entertainment and away from the products. You'll hear the discussion about that one.																																											
R Now can I just check this off again. As you were getting these groupings laid out it looked to you as if they were falling into two broad categories. Products and entertainment. And the 'different' group too. That was in your mind?			TEACHER ACTIONS <i>Unspecified - "I'm trying to get them..."</i>																																								
T Right.			ACTION CONDITIONS 																																								
R So you decided to see whether the kids could recognize those groupings?																																											
T Exactly it.			END STATES <i>Learner Behaviour</i> <i>"Come up with these two"</i>																																								
R And the problem of all those overlapping sub-categories - that was something that you'd thought about, been concerned about at the same time?																																											
T Mhm.			EVALUATIVE CRITERIA <i>Learner Behaviour</i> <i>(Categories sought)</i>																																								
R Good. I've got that clear now.																																											

Planning Record Notes

- Share ideas - group labels into diff type of ads

- Message - or common theme

- Cate of ads
What is advertising?

- 2 gps do this

- Will pupils arrive at a genuine group discussion or will the more vocal dominate others and press their definition on the group

Plan Interview

- R "Share .. So this is, you want the kids to present the ideas they've come up with from their group work."
- T Yes.
- R Group labels into different types of ads. The group as a whole to suggest labels? Or the kids who generated the groupings back here. Perhaps you need to clarify that.
- T I'm wondering what I meant myself. Oh yeah, I think what I had there, was when they came back with their labels, they'd go off and write their labels, individual ideas for each thing, right. Now if they'd all come back with, as it was, as happened in the lesson. If someone comes back with a group called entertainment and someone else back with one called entertainment and movies, these were merged into one pile. They came from two separate pairs. These were merged into one pile.
- R But essentially this is really just sequence. The group would label initially and then there would be a sharing of ideas after that.
- T Is there a message or common theme to all these advertisements? They are all trying to say something or to solicit a particular response. They are all trying to - they all have the intention of selling.
- R At this point are you really considering a topic that is to come out of this discussion?
- T That there was written because I was aware that I was going to come up with a definition of advertising, and that was a finishing point and a starting point of my lesson.
- T Then I started that. Used that as data for the definition which was the main idea. And a good Brunnerian approach.
- R This is a point to come out, and at this stage there is no indication as to whether you're going to make this point, or you're going to solicit it from the kids.
- T Oh.
- R Or is this something you want to solicit?
- T No, it means a question.
- R It essentially means a question.
- T Right. It means, is there a message or is there a common theme.
- R I was about to suggest that, but I thought I'd let you otherwise I might put words in your mouth.
- T We're trying to be inductive.
- R Categories of ads. What is advertising. Now does, this pick up the point you have just made in terms of sequence?
- T Right. This will give rise to, from this we hope to get various categories of advertisements, and from that come to a definition of what is advertising. These were some of my first jottings. It means, it really means we talking about a similar sort of thing. I think means .. the children will arrive or come to or produce, sorry, various categories of advertisements, and this be a preliminary to putting this question.
- R So in a sense there's a timing, sort of sequencing decision wrapped up in this as well. You seem to be saying there are two major topics for the discussion. Categories of advertising. What advertising is .. and did you have a question in mind at this point? You'd actually ask the kids, what is advertising?
- T Yes.
- R Two groups do this.
- T Oh yes, well there was the possibility of splitting them into two groups. The possibility of that question, what is advertising, being discussed with two groups of say four, and coming back and sharing. Right, which leads on to
- T Will pupils.. If I had two groups, splitting the 8 into 2 groups of four to go and find, to arrive at their idea of what is advertising - in their groups of four, could I then get a definition from the most vocal member on the group response - the so-called group response. In fact it was one guy's idea, the others sort of adopted, accept, or are brainwashed into a which is a great concern.
- R Now at that point, was this concern sufficient for you to reject that as a possibility, or were you still just leaving it hanging.

FIGURE 3 : Categorizing Pre-Lesson Planning Thoughts:
Review, Clarification and Confirmation Procedure

FIGURE 4 : Elements of Teaching Plans and Actual Teaching Learning Situations

1. END STATES	2. TEACHER ACTIONS	3. ACTION CONDITIONS	4. EVALUATIVE CRITERIA
1.1 <u>The Learner</u> - acquires new learnings - engages in learning task behaviour - has knowledge of intended/actual elements of teaching-learning episodes. - makes decisions about elements of teaching-learning episodes. - engages in non-learning behaviours 1.2 <u>The Teacher</u> - has knowledge of learner behaviour. - has knowledge of learner knowledge of intended/actual elements of teaching-learning episodes. - has knowledge of learner decisions re elements of teaching-learning episodes. - has knowledge of other teaching-learning conditions. 1.3 <u>Other Person</u> - acquires knowledge - engages in overt behaviour 1.4 <u>Material Means</u> - made, modified 1.5 <u>Physical Conditions</u> - created, modified	3.1 Inform 3.2 Question 3.3 Direct 3.4 Suggest 3.5 Record 3.6 Enact 3.7 Show 3.8 Distribute 3.9 Collect 3.10 Read 3.11 Wait	3.1 Mode 3.2 Method 3.3 Topic Focus 3.4 Means 3.5 Data Source 3.6 Timing 3.7 Duration 3.8 Location 3.9 Class-Group Size 3.10 Grouping 3.11 Participation 3.12 Group Membership	4.1 Evaluative Criteria - End-States 4.2 Evaluative Criteria - Teacher Actions 4.3 Evaluative Criteria - Action Conditions

24.

FIGURE 5 : Additional Categories of Within-Lesson Attention and Thought

1. REFLECTIONS	2. PERCEPTIONS	3. ANTICIPATIONS	4. JUDGEMENTS
The focus of the teacher's thoughts is on information s/he already has in mind.	The focus of the teacher's attention and thoughts is directed to immediate conditions, events or actions within the lesson.	The focus of the teacher's thoughts is on circumstances (unplanned) that may eventuate at some future point in the current lesson or future lessons.	The focus of the teacher's thoughts is on opinion, estimate, evaluation or conclusion.
The teacher reflects on: 1.1 planned actions, action conditions, end-states, evaluative criteria. 1.2 actual actions, action conditions, end-states, evaluative criteria. 1.3 existing information about the attributes of learners. 1.4 other information.	The teacher perceives: 2.1 learner behaviour - Class/Group/Individual - Verbal Behaviour-Substance - Verbal Behaviour-Other - Occurrence-Non Occurrence - Non-verbal Behaviour 2.2 teacher actions 2.3 teacher affective state 2.4 another person's behaviour 2.5 material means 2.6 physical conditions 2.7 time	The teacher anticipates: 3.1 teacher actions 3.2 action conditions 3.3 end-states 3.4 evaluative criteria	The teacher 'judges': 4.1 the appropriateness of planned or actual specifications for lesson elements. 4.2 the extent to which evaluative criteria for teaching intentions have been fulfilled. 4.3 the ability of the learner(s) to undertake or accomplish learning tasks or learning achievements. 4.4 the 'meaning' of learning behaviour.

25.

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